Regulatory Advisory

August 2008,

TRU Advisory: 08-08
Using Biodiesel as a TRU ATCM Compliance Option

The purpose of this advisory is to explain how biodiesel may be used to comply with the TRU ATCM and discuss some of the issues related to its use.

Background

The Transport Refrigeration Unit (TRU) Airborne Toxic Control Measure (ATCM) (title 13 California Code of Regulations (CCR), section 2477) requires owners to bring their TRU and/or TRU generator set[1] (genset) engines into compliance with in-use performance standards. There are two levels of stringency for these in-use performance standards. The Low-Emission TRU In-Use Performance Standard (LETRU) reduces diesel particulate matter (PM) by at least 50 percent. The Ultra-Low-Emission TRU In-Use Performance Standard (ULETRU) reduces diesel PM by at least 85 percent. In-use performance standard compliance dates are phased in, based on the engine model year (MY), as shown in Table 1.

Table 1
In-Use Performance Standard Compliance Dates

MY	LETRU	ULETRU
2001 and older	December 31, 2008	December 31, 2015
2002	December 31, 2009	December 31, 2016
2003	Not Applicable	December 31, 2010
2004 and subsequent	Not Applicable	December 31st of 7th year after MY

Alternative Technologies can be used to meet the LETRU and ULETRU In-Use Performance Standards if diesel PM emissions are eliminated while at a distribution facility (ref. 13 CCR section 2477 (e)(1)(A)3.) Subparagraph (e)(1)(A)3.d. allows compliance to be achieved if the TRU is fueled exclusively with an alternative diesel fuel, such as biodiesel, in accordance with the requirements of subsection (e)(2)(A), which are as follows:

1. Maintain records of alternative diesel fuel use in accordance with 13 CCR, §2477, subsection (f)(1)(B) to show the TRU uses only the chosen alternative diesel fuel for all operations in California.[2]
2. Use only fuel that is a VDECS[3] alternative diesel fuel that contains no conventional diesel or CARB diesel fuel[4] in TRUs operated in California.
3. Permanently affix a label in clear view near the fuel tank fill spout that identifies the proper fuel that is required to be in compliance with the TRU ATCM.

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[1] Hereinafter, the use of the term TRU also indicates TRU generator sets, unless otherwise specified.
[2] For example, the TRU must be fueled exclusively with biodiesel.
[3] VDECS stands for verified diesel emission control strategy.
[4] For example 100 percent biodiesel (B100).

4. In the event that the operator decides to revert to using conventional diesel or CARB diesel fuel, the operator shall comply with the in-use operation requirements of 13 CCR, §2477, subsection (e)(1) within 10 days of discontinuation of biodiesel fuel use. Within 10 days of discontinuation, the operator shall notify the Executive Officer in writing of this change in fuel use and shall include an update to any ARB I.D. number application or operator report submitted to comply with subsections (e)(1)(E), (e)(1)(F), or (f)(1) of 13 CCR 2477.

Subsection (f)(1)(B) lists the recordkeeping and reporting requirements for alternative diesel fuel:

1. Operators that choose a compliance pathway that involves the use of biodiesel fuel in accordance with subparagraph (e)(1)(A)3.d. shall maintain records that document exclusive use of biodiesel and the hours of operation for each affected engine. Appropriate records would be copies of receipts or invoices of fuel purchases, fuel records for each unit, and daily operating hour logs for each unit.
2. Records shall be kept available for a minimum of three (3) years and shall be compiled and made available to the ARB upon request.
3. Failure to keep records or submittal of false information is a violation of state law subject to civil penalty.

Biodiesel must be verified as a VDECS. Verification of biodiesel must be done in accordance with 13 CCR, section 2710. Subsection (f) requires a multimedia assessment (MMA) to be conducted on biodiesel and the California Environmental Policy Council (EPC) must determine that use of the fuel will not cause a significant adverse impact on the public health or the environment.

What are some of the issues related to using biodiesel?

Is biodiesel verified as a VDECS?

The California Air Resources Board (ARB) is conducting the MMA, which is scheduled to be completed around the end of 2008. If the MMA results in an EPC finding of no significant adverse impact, then verification as a VDECS would be the next step, although verification could be completed in parallel with the MMA. As of August 2008, no biodiesel producers have submitted applications for verification of biodiesel as a VDECS, but several companies have inquired about this procedure. Even if all goes well with the MMA and verification applications are submitted, use of biodiesel does not appear to be a viable compliance option for the first TRU ATCM compliance date, December 31, 2008, but may be available at some point in the future. ARB cannot predict when biodiesel will be verified as a VDECS.

Why does ARB allow biodiesel for compliance with the TRU ATCM?

The use of pure biodiesel (B100) fuel reduces PM emissions, but these reductions alone may not meet LETRU (50 percent PM reduction) and certainly don't meet ULETRU (85 percent PM reduction). However, the PM emissions from an engine that is fueled with B100 are not considered to be diesel PM because there is no conventional diesel fuel being combusted. Diesel PM has been determined to be a toxic air contaminant and State law requires reductions in diesel PM emissions. However, the PM emitted from B100-fueled engines has not be determined to be a toxic air contaminant. Therefore, the use of B100 eliminates the emissions of diesel PM and meets the fundamental condition of being an Alternative Technology.

How much conventional diesel can be added to biodiesel and still be used as a compliance option?
With very narrow exceptions, conventional diesel fuel can not be used in an Alternative Technology to achieve compliance with the TRU ATCM. However, ARB allows very small quantities of conventional diesel to be added to pure biodiesel such that the resulting blend qualifies for the biodiesel blenders' federal tax credit. The amount of conventional diesel in the resulting blend must be insignificant compared to the amount of pure biodiesel. For example, one ounce in a thousand gallons would be considered insignificant.

Are nitrogen oxide emissions a concern with biodiesel use?
Some emissions test data show that nitrogen oxide (NOx) emissions may be greater with biodiesel than with conventional diesel. If NOx emissions are shown to increase more than 10 percent, compared to conventional diesel, then biodiesel would not qualify for verification as a VDECS. That is because NOx is an ozone precursor and many areas of the State have unhealthy levels of ozone. Several variables may affect the level of NOx emissions, including but not limited to, load factors and the feed stock used to produce biodiesel. Additionally, there may be additives or other strategies that can reduce NOx emissions, but these would need to be included in the verification. TRU engine testing with biodiesel from several feed stocks is planned to determine if NOx emissions exceed the 10 percent threshold.

Are there any operational concerns related to switching to biodiesel?
Several TRU fleets have used B100 both on a limited demonstration basis and for extended periods of time. Very few problems were reported. Fleets that are interested in biodiesel should be aware that biodiesel may have some operational concerns, some of which may be evaluated as part of the verification process. The National Biodiesel Board's (NBB) website provides information on biodiesel use at: http://www.biodiesel.org. Click on the "Resources" and "Buying Biodiesel" tabs near the top. Also, their "Biodiesel Handling and Use Guide" is a resource: http://www.nrel.gov/vehiclesandfuels/npbf/pdfs/40555.pdf. It may also be advisable to contact the engine manufacturer to see if they have any recommendations on the use of biodiesel that is specific to their engines. The use of B100 may void engine warrantees, but by the time TRU ATCM compliance is required at seven years after the engine model year, warrantees have typically lapsed.

Some potential issues to be aware of are described below:

1. The most common issue is the gelling of biodiesel in cold weather. Biodiesel's cold flow properties begin to be problematic at a higher temperature compared to conventional diesel. Operators may need to heat and/or insulate fuel lines, filters, on-board fuel tanks, dispensing equipment, and above-ground storage tanks.
2. Fuel quality is important. Buy only from producers and marketers that are certified by NBB to meet their BQ9000 Quality Assurance Program. Companies certified to meet BQ9000 have quality management systems that cover storage, sampling, testing, blending, shipping, distribution, and fuel management practices. In addition, biodiesel should meet the ASTM D 6751 product specification.
3. Biodiesel loosens up the sludge build-up from conventional diesel. Flushing fuel lines and replacing fuel filters more often at the onset of biodiesel use to minimize potential problems should be considered.
4. Fuel hoses and seals may swell and soften with biodiesel use and may need to be changed to materials that are more compatible with biodiesel.

5. Biodiesel blow-by may cause gelling in the engine crankcase. Oil change intervals may need to be reduced to minimize this.
6. Storage of biodiesel needs special consideration due to its shorter shelf life compared to CARB diesel. Contact the supplier or the NBB on the appropriate storage methods, conditions, storage time and if additives are recommended. Biocides are available to control algae growth and extend the shelf life. Operators should size storage tanks appropriately and avoid overstocking so that tank turn intervals are not excessive. Exposure to air can potentially affect the oxidative stability of biodiesel. An antioxidant and/or a nitrogen gas cap on storage tanks may be the preferred method of storage, especially if planning to store for an extended period of time. Similarly, don't allow a TRU that is fueled with biodiesel to be unused for long durations to avoid algae growth and filter clogging.
7. Rags contaminated with biodiesel can spontaneously combust. Contaminated rag handling and storage inside an airtight metal container are important safety considerations.

For more information

To obtain a copy of the regulation or other related compliance assistance documents, visit the TRU website at http://www.arb.ca.gov/diesel/tru.htm. Additional questions may be addressed by calling the toll-free TRU Help Line at 1-888-878-2826 (1-888-TRU-ATCM).
If you have a disability-related accommodation need, please go to http://www.arb.ca.gov/html/ada/ada.htm for assistance or contact the ADA Coordinator at (916) 323-4916. If you are a person who needs assistance in a language other than English, please contact the Bilingual Coordinator at (916) 323-7053.

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